Rocks from the big screen
Indoor preparation for outdoor field work, using a picture and specimens

Use the suggestions in this activity to prepare pupils for an outdoor visit to a rock exposure in your own locality. If projection equipment and a large screen are available, project a photograph of a rock face (as given below, or one of your own). Ask pupils to pretend that they are looking at the actual rock face. Alternatively, print off a large copy of the photograph for each small group of pupils.

Place some appropriate rock specimens on the floor below the screen, as though they had fallen from the rock face.

Ask pupils to:

- pick up 'fallen samples' of each rock type shown in the photograph: describe them and look for clues about how each rock was formed. (Ensure that the pupils' heads do not get in the way of the projection beam when they go to pick up their specimens!);
- draw a scaled diagram of the rock face and to label as many relevant features as they can. Tell them that you are not looking for a great work of art, but that they should try to show the geology by simple lines. The hammer handle is about 35cm long;
- prepare for a debate on the geological events which might be shown by the photograph.

Rocks exposed in a low cliff, near Portishead, Somerset, UK. (Photo: *Peter Kennett*)

The back up

Title: Rocks from the big screen

Subtitle: Indoor preparation for outdoor field work, using a picture and specimens

Topic: An activity involving the careful observation and recording of geological features, carried out indoors, using an image of a suitable site. The activity may be used as an exercise in its own right, or as a preparation for actual fieldwork. If pupils are prepared in this way, it will save precious time when on location.

Age range of pupils: 11 -18 years

Time needed to complete activity: at least 30 minutes, depending on the details with which the photograph and specimens are analysed.

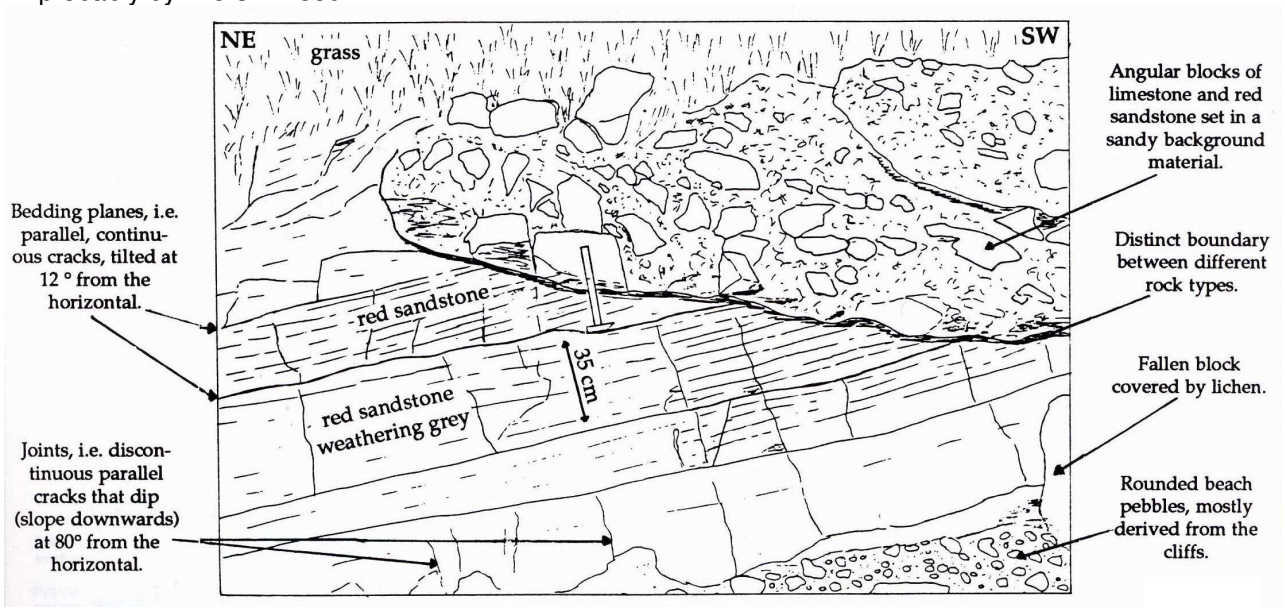
Pupil learning outcomes: Pupils can:

- observe geological features carefully;
- realise that the scientific value of a diagram is enhanced if they add a scale and a direction of view;
- draw and label a diagram of a rock exposure, without trying to be too 'arty';
- interpret the geological history of an exposure, using evidence which they have observed for themselves;

- debate their interpretations in an orderly fashion.

Context:
The scaled diagram shown here is all that is required to explain the geology of the exposure: there is no need for 'arty' shading etc. Pupils should show the scale (from the hammer) and the direction of view (shown here by labels, but in the field they would be reminded to use a compass). They do not need to use technical vocabulary (e.g. "joints", "bedding planes") until these have been explained. Depending on the examples used, the location in the rock face of the 'fallen specimens' should be fairly obvious, although help may be needed as pupils describe their samples. In this example:

- There are two distinct sets of beds, with an angular break between them ("distinct boundary....").
- This break is called an **unconformity,** and represents a time when sediments were not deposited at this site.
- The beds below the unconformity are red sandstones of Devonian age. The red colouration indicates that they were deposited as loose sand under tropical conditions, probably by rivers in flood. The loose sands became compacted and cemented to form hard red sandstones.
- These red sandstones were tilted by Earth movements, resulting in an apparent dip to the northeast and cracking of the rocks to form joints.
- A period of erosion followed, when a hollow was cut into the uppermost sandstone beds (probably the side of a valley).
- Fragments of limestone and red sandstone fell into the valley and were moved to this site, but without much erosion by water, since they are still angular. (This took place in the Triassic Period).
- These rocks became cemented together and the whole sequence was lifted up by Earth movements.
- More recent coastal erosion has resulted in the low cliff as seen today, with pebbles derived from the cliff and elsewhere lying on the beach below it.



Scaled and labelled diagram from the photograph above

Following up the activity:
During the pupils' feedback debate, they could be asked what further evidence they would look for, if they could visit the site, to strengthen their case. In this case, limestone is represented in the Triassic boulders above the unconformity, but there is no source of such limestone fragments in the photograph. The limestone is in fact of Carboniferous age, and the nearest outcrop is within one kilometre. There is no better follow up activity than actually to take the class out for some real fieldwork!

Underlying principles:

- See 'Context' for a description of this site.
- Red colouration in sedimentary rocks is often an indication of tropical/sub-tropical conditions in the past, whereby abundant oxygen in the environment enables weathering of the parent rocks to form compounds of iron (Fe^3).
- The uniform layering in the older beds here suggests deposition from a fast-flowing river, rather than from wind. Such rivers were probably ephemeral, flowing only in a wet season.
- Unconformities are of great significance in the geological record, since they indicate more than one phase of deposition.

Thinking skill development:
Pupils build up a cognitive pattern whilst they observe and record their findings. Cognitive conflict may result in the debate at the end of the activity (but hopefully no other sort of conflict!). Relating their indoor work to a real site would be a natural bridging activity.

Resource list:

- a data projector and screen
- a suitable photograph – as supplied, or one of your own, or from the web, either for projection, or to print off on paper
- some appropriate rock specimens to match the photograph
- hand lenses

Useful links: See the E-library of the National Science Learning Centre for a full version of "Steps towards the rockface" - http://www.nationalstemcentre.org.uk/elibrary/resource/1150/steps-towards-the-rock-face-introducing-fieldwork

Source: Originally devised by Peter York, King Edward VII School Sheffield, for Science of the Earth 11-14 '*Steps towards the rock face',* Earth Science Teachers' Association, 1991, Sheffield, Geo Supplies Ltd.